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1 OF 1
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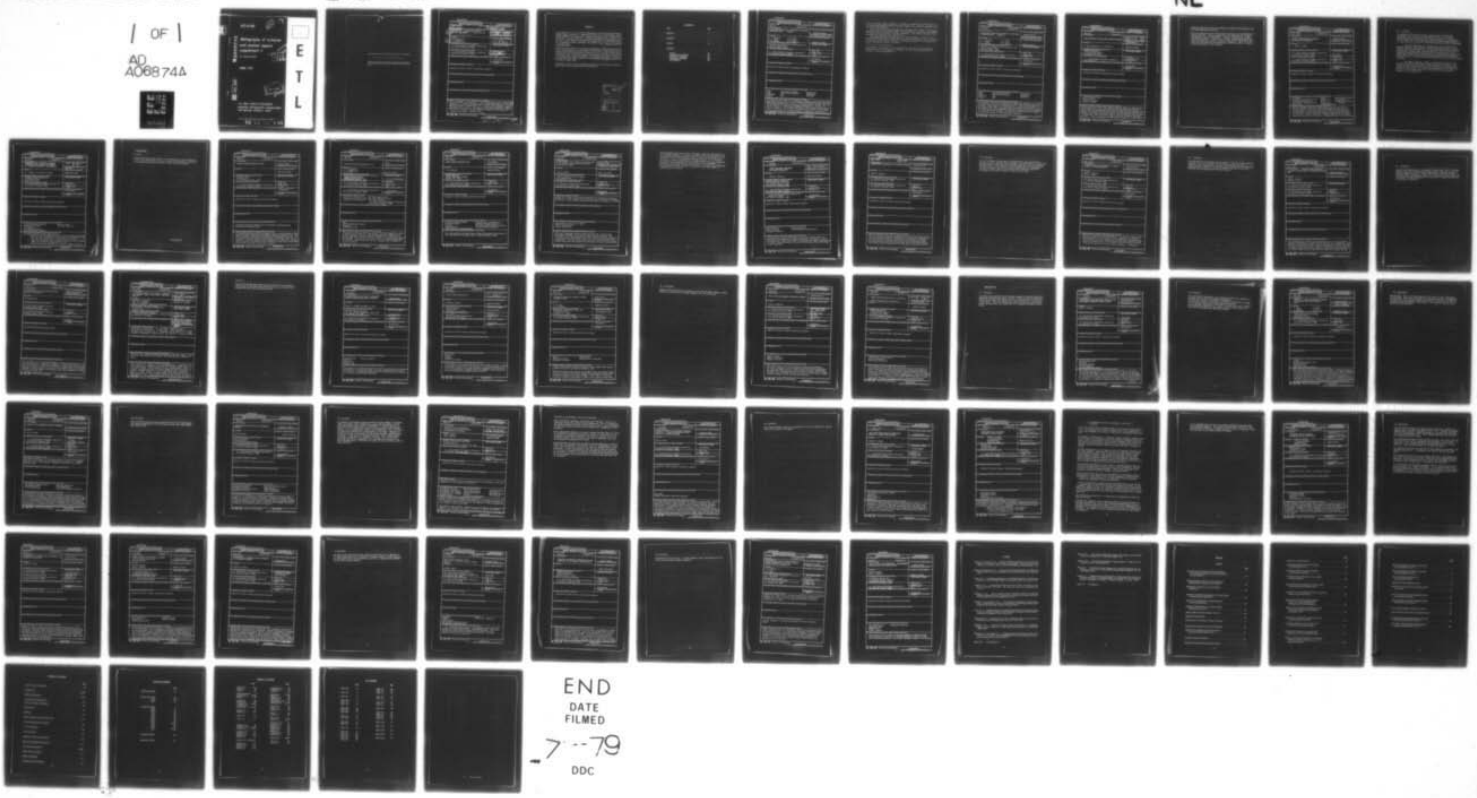

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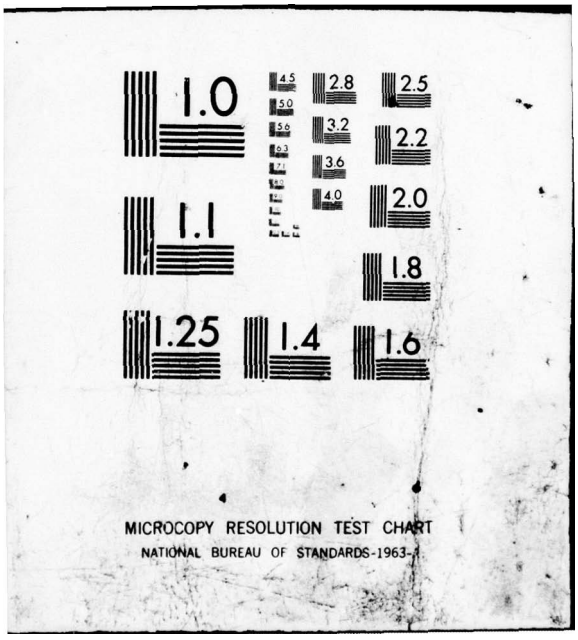
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NATIONAL BUREAU OF STANDARDS-1963-A

ETL-0180

Bibliography of in-house and contract reports supplement 7

E. James Books

APRIL 1979

U.S. ARMY CORPS OF ENGINEERS
ENGINEER TOPOGRAPHIC LABORATORIES
FORT BELVOIR, VIRGINIA 22060

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REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER: 14 ETL-0180	2. GOVT ACCESSION NO. (9)
3. RECIPIENT'S CATALOG NUMBER: Report for	
4. TITLE (and Subtitle): (6) BIBLIOGRAPHY OF IN-HOUSE AND CONTRACT REPORTS, SUPPLEMENT 7.	5. TYPE OF REPORT & PERIOD COVERED: 1 Jan [redacted] - 31 Dec 78
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): (10) E. James Books	8. CONTRACT OR GRANT NUMBER(s): (12) 72 p.
9. PERFORMING ORGANIZATION NAME AND ADDRESS: U. S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia 22060	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: U. S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia 22060	12. REPORT DATE: (11) Apr [redacted] 79 13. NUMBER OF PAGES: 69
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report): Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This is supplement 7 to the report titled "Bibliography of In-House and Contract Reports," (AD-877 653L), (Supplement 1, AD-890 066L), (Supplement 2, AD-905 548L), (Supplement 3, AD-B005 275L), (Supplement 4, AD-B010 642L), (Supplement 5, AD-B019 966L), (Supplement 6, AD-A055 468). It is a continuing bibliography of reports prepared by and for the U. S. Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, Virginia. This bibliography includes reports published from 1 January 1978 through 31 December 1978.

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PREFACE

This is Supplement 7 to the report titled "Bibliography of In-House and Contract Reports" (AD-877 653L), (Supplement 1, AD-890 066L), (Supplement 2, AD-905 548L), (Supplement 3, AD-B005 275L), (Supplement 4, AD-B010 642L), (Supplement 5, AD-B019 966L), (Supplement 6, AD-A055 468). It is a continuing bibliography of reports prepared by and for the U. S. Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, Virginia. This bibliography includes reports that were published from 1 January 1978 through 31 December 1978.

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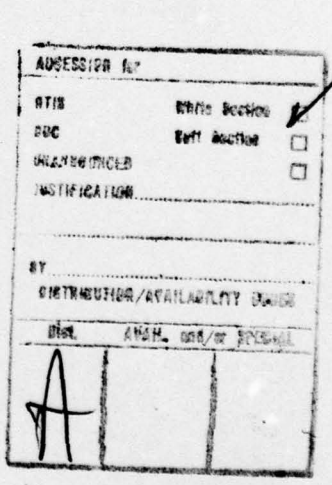
COL Daniel L. Lycan, CE, was Commander and Director of ETL during the report preparation. Mr. Robert P. Macchia was the Technical Director.



CONTENTS

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0117	2. GOVT ACCESSION NO. AD-A053 253	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) RADAR IMAGE SIMULATION: VALIDATION OF THE POINT SCATTERING MODEL VOLUME I		5. TYPE OF REPORT & PERIOD COVERED Contract Report
		6. PERFORMING ORG. REPORT NUMBER RSL Technical Report 319-27
7. AUTHOR(s) J. C. Holtzman, V. S. Frost V. H. Kaupp, E. E. Komp J. L. Abbott, E. C. Davison		8. CONTRACT OR GRANT NUMBER(s) DAAG53-76-C-0154
9. PERFORMING ORGANIZATION NAME AND ADDRESS University of Kansas Center for Research, Inc. 2291 Irving Hill Drive Lawrence, Kansas 66045		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE Sept. 1977 13. NUMBER OF PAGES 210
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Radar	Side-Looking Airborne	Reflectivity
Image	Plan Position Indicator	Backscatter
Simulation	SLAR	Data Base
Digital	PPI	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The purpose of this report is to present the validation of the Point Scattering Radar Image Simulation Model and its software implementations developed at RSL (Remote Sensing Laboratory, University of Kansas, Lawrence, Kansas). The work was sponsored by ETL (Engineer Topographic Laboratories, U. S. Army, Fort Belvoir, Virginia). Two different instances of model validation are reported. First is validation of both SLAR (Side-Looking Airborne Radar) and PPI (Plan-Position Indicator) radar simulation models by comparison of simulations to real images (of exactly the same ground swath) having the same look direction

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(cont.) and other flight parameters. Second is a quantitative validation of a PPI model specialized to making reference scenes for a terminal guidance system (using the Correlatron*).

The results obtained have shown the simulated radar images to be accurate representations of the ground scenes at the microwave frequencies they modeled. The comparisons were shown to be very favorable. Preliminary results of the guidance test have been very satisfactory.

Data base construction techniques are also discussed. Alternate input intelligence data sources (high-resolution aerial photographs, maps, infra-red) for feature extraction are reviewed. A conceptual design for an interactive feature extraction system is discussed.

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*Correlatron is the name of a two-dimensional cross-correlation measuring device manufactured by Goodyear Aerospace. The ETL has a Correlatron installed in a test configuration.

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1. REPORT NUMBER ETL-0118	2. GOVT ACCESSION NO. AD-A053 240	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) RADAR IMAGE SIMULATION: VALIDATION OF THE POINT SCATTERING MODEL VOLUME II		5. TYPE OF REPORT & PERIOD COVERED Contract Report 6. PERFORMING ORG. REPORT NUMBER Remote Sensing Lab 319-28
7. AUTHOR(s) J. C. Holtzman, V. S. Frost V. H. Kaupp, E. E. Komp J. L. Abbott, E. C. Davison		8. CONTRACT OR GRANT NUMBER(s) DAAG53-76-C-0154
9. PERFORMING ORGANIZATION NAME AND ADDRESS University of Kansas Center for Research, Inc. 2291 Irving Hill Drive Lawrence, Kansas 66045		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE Sept. 1977 13. NUMBER OF PAGES 354
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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Radar	Side-Looking Airborne	Reflectivity
Image	Plan Position Indicator	Backscatter
Simulation	SLAR	Data Base
Digital	PPI	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The technical details of all aspects of the radar image simulation are reported In particular, the activities associated with the Point Scattering Method are discussed. They include: (1) construction of a ground truth data base, i.e., the terrain model which incorporates elevation and dielectric behavior; (2) digitization of the terrain information to build a digital matrix; (3) formation of a backscatter data catalogue; (4) radar device modeling; and (5) problems and solutions inherent in image handling and analysis.

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1. REPORT NUMBER ETL-0127	2. GOVT ACCESSION NO. AD-A051 845	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) HIGH RESOLUTION OPTICAL POWER SPECTRUM ANALYZER		5. TYPE OF REPORT & PERIOD COVERED February 2, 1977 Final December 2, 1977 Report 6. PERFORMING ORG. REPORT NUMBER EC/2106801-FR
7. AUTHOR(s) N. Balasubramanian, P. S. Considine		8. CONTRACT OR GRANT NUMBER(s) DAAK70-77-C-0046
9. PERFORMING ORGANIZATION NAME AND ADDRESS EIKONIX CORPORATION 103 Terrace Hall Avenue Burlington, MA 01803		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratory Fort Belvoir, VA		12. REPORT DATE 31 January 1978 13. NUMBER OF PAGES 83
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Optical Power Spectrum
Coherent Optics
Optical Processing
Spectral Analysis

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The High Resolution Optical Power Spectrum Analyzer (HOPS) was conceived as a better approach to a large volume optical power spectrum (OPS) scanning of imagery. This approach enables conventional OPS measurement coupled with simplified parallel optical film sampling, rather than film scanning. The HOPS is a coherent optical system that lends itself to many applications either proposed or demonstrated, such as pattern recognition, feature extraction and image assessment. Custom configuration of HOPS enables optimum use of off-the-shelf

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scanning photodiode arrays and adaption to specific film scanning and spectrum sampling requirements.

This work demonstrates the basic metric equivalence between HOPS and conventional OPS. It also demonstrates the advantages of the HOPS configuration for OPS measurement. Several configurations of HOPS have been evaluated. A design using linear, self-scanned photodiode arrays with parallel optical trains is recommended. This report presents detailed analysis and measurements supporting HOPS as a highly practical approach to OPS scanning.

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1. REPORT NUMBER ETL - 0128	2. GOVT ACCESSION NO. AD-A055 013	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* REVIEW OF PHOTOSENSITIVE MATERIALS FOR HOLOGRAPHIC RECORDINGS		5. TYPE OF REPORT & PERIOD COVERED Technical Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) James W. Gladden		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 4A161102B52C
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE April 1978 13. NUMBER OF PAGES 84
14. MONITORING AGENCY NAME & ADDRESS(*if different from Controlling Office*)		15. SECURITY CLASS. *(of this report)* Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

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18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Holography	Diazos	Photochromic Materials
Holographic Recording Materials	Diazo-Oxides	Photopolymers
Photosensitive Materials	Azides	Bleached Silver Halide Holograms
Electrostatic Imaging Materials	Diazo Gelatin	
Photoresists	Dichromated Gelatin	

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

There is a program objective to systematically evaluate photosensitive recording materials that can be used in holographic and other coherent optical systems. In association with this, a detailed literature search was undertaken in which considerable information was obtained and compiled in this report. However, the recent literature describing the recording materials, particularly the nonsilver recording materials, is often confusing

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20. continued

or incomplete. Very little detail is given about the chemistry, mechanisms, and processes of these materials with a view toward developing particular materials for use in holography. An objective of this report is to describe these aspects of the recording materials in a way that will aid in their future development and use in holography.

Over 100 references were reviewed that treat electrostatic imaging materials, photoresists, hardened dichromated gelatin, photopolymers, photochromic materials, and bleached silver halide materials. Subcategories include Scott Graphics TEP film; photoplastic film; diazos, diazo-oxides and azides; Shipley's AZ 1350 positive photoresist; Hughes-NRC, DuPont and Bell Laboratories photopolymers; photochromic lithium niobate; and different halide bleaches for silver halide bleached holograms.

The report compares a number of the characteristics of the different classes of holographic recording materials. Problems associated with the recording materials are described, and those material properties that enable use in important applications are pointed out. The not too well known chemistry of certain well known recording materials is also described.

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1. REPORT NUMBER: ETL-0132	2. GOVT ACCESSION NO.: AD-A049 698
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE *(and Subtitle)*: ASSOCIATIVE ARRAY PROCESSING OF RASTER SCANNED DATA FOR AUTOMATED CARTOGRAPHY II (IMPROVED RESOLUTION & DATA HANDLING)	5. TYPE OF REPORT & PERIOD COVERED: Final - May 1976 to Oct. 1977
	6. PERFORMING ORG. REPORT NUMBER: GER-16523
7. AUTHOR(s): N. J. Adams, J. M. Vocar, K. Losch	8. CONTRACT OR GRANT NUMBER(s): DAAG53-76-C-0146
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Goodyear Aerospace Corporation, 1210 Massillon Road, Akron, Ohio 44315	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: U. S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia 22060	12. REPORT DATE: November 1977
	13. NUMBER OF PAGES: 150
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18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Associative Array Processing
automated cartography
line thinning
line symbol generation
line separation by thickness
raster to vector
run length coded data

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The primary objective of this effort was to:

a) expand the existing STARAN cartographic raster processing capability from 4-mil in/out processing to; 4-mil input with 4-mil output; 2-mil input with 2-mil output; and 1-mil input with 1-mil output.

b) expand the I/O capabilities to include processing of ETL run-length-coded data and DMA run-length-coded data, and

c) perform some initial investigation of contour tagging techniques.

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20. Cont.

These modifications were based on the processing of map overlays up to 19 x 22 inches (data area), and include the capability to generate those symbols previously provided at 4-mil (only) processing.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0135	2. GOVT ACCESSION NO. AD-A059 435	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* GEO-SPIN PRECISION INERTIAL SURVEY		5. TYPE OF REPORT & PERIOD COVERED Contract Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR*(s)*		8. CONTRACT OR GRANT NUMBER*(s)* DAAK 70-77-C-0070
9. PERFORMING ORGANIZATION NAME AND ADDRESS Avionics Division Honeywell, Inc. St. Petersburg, Florida 33733		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. A rmy Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE April 1978 13. NUMBER OF PAGES 449
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Surveying Feasibility Demonstration with Honeywell Inertially-Stable Electrostatic Suspension Gyros

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

A surveying feasibility system was assembled using a modified Honeywell GEANS Airborne Navigation System utilizing Electro-statically suspended gyros. The system utilized a conventional mini-computer and was mounted in a truck. The unit was then used to survey at St. Petersburg, Florida and at White Sands, New Mexico. This test program showed performance of one meter with the identification of several error sources in the software area, which when incorporated should reduce the errors to less than 0.1 meters.

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1. REPORT NUMBER ETL-0136	2. GOVT ACCESSION NO. AD-B026 413L	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Relational Data Base Management Study		5. TYPE OF REPORT & PERIOD COVERED Final 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) W. I. Longstreth F. B. Moosbrugger R. L. Smith		8. CONTRACT OR GRANT NUMBER(s) DAAK-70-77-C0272
9. PERFORMING ORGANIZATION NAME AND ADDRESS International Business Machines Corporation Federal Systems Division Command and Space Systems 18100 Frederick Pike Gaithersburg, Maryland 20760		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 6.37.01.B, R3205-HT-08
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE 3 March 78 13. NUMBER OF PAGES 102
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DBMS
Data Base Management Systems
Relational
Implementation Plan

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report contains the results of a study which had two objectives. First, to determine the feasibility of implementing a relational DBMS on the ETL hardware. Second, to develop a plan for implementing an experimental relational DBMS either on existing ETL ADP equipment or on modified or upgraded ADP equipment. The result of the study is a plan to implement INGRES which is the system selected by ETL from the four approaches that satisfied the selection criteria.

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1. REPORT NUMBER ETL-0137	2. GOVT ACCESSION NO. AD-A052 421	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* IMAGE SCANNER TECHNOLOGY STUDY		5. TYPE OF REPORT & PERIOD COVERED FINAL REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) J. S. Montuori		8. CONTRACT OR GRANT NUMBER(s) DAAK70-77-C-0124
9. PERFORMING ORGANIZATION NAME AND ADDRESS PERKIN-ELMER CORP OPTICAL TECHNOLOGY DIVISION Danbury, CT. 06810		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE March 1978 13. NUMBER OF PAGES
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18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Electronic Scanning Systems
Cathode Ray Tubes
Vidicons
Image Dissectors
Solid-State Array Scanning Systems
CCD, CID, SSPD, and CCPD Arrays
Mechanical Scanning Systems
Flat Bed, Rotating Drum, Rotating and Oscillating Mirror Scanners.

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This study evaluates available image scanning technologies as they relate to the requirements for providing inputs to digital mapping systems.

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1. REPORT NUMBER ETL-0138	2. GOVT ACCESSION NO. AD-B034 320L	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) The Measurement of the Change in the Deflection of the Vertical with a Schuler-Tuned North-Slaved Inertial System		5. TYPE OF REPORT & PERIOD COVERED Contract Report September 1976 - October 1977 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) James R. Huddle		8. CONTRACT OR GRANT NUMBER(s) DAAG 53-75-C-0248
9. PERFORMING ORGANIZATION NAME AND ADDRESS Litton Guidance and Control Systems 5500 Canoga Avenue Woodland Hills, California 91364		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS US Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE November 1977 13. NUMBER OF PAGES 111
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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Rapid Geodetic Survey System (RGSS)
Inertial Survey System
Vertical Deflection

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report determines methods by which the deflection of the vertical measurement performance of an inertial system could be optimized. This optimization was to be considered within the constraint that the mechanization available for the gravity survey task is that of the Rapid Geodetic Survey System (RGSS). The report first reviews the basic theory of how the inertial surveyor establishes the deflection of the vertical at points between stations

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where reference deflection values are known. Then the error model for the inertial surveyor is reviewed to establish how the individual error sources affect the accuracy with which the vertical deflection can be determined. Next the performance-limiting features of the inertial surveyor as currently embodied by the RGSS mechanization are identified and methods for contending with these factors are recommended. In addition to describing calibration techniques to improve the performance of the RGSS for single traverse utilization, other improvement recommendations are listed.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0139	2. GOVT ACCESSION NO. AD-A-053 259	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) DIRECT ELECTRONIC TRANSFORMS FOR FEATURE EXTRACTION		5. TYPE OF REPORT & PERIOD COVERED Final - Contract Report 2 March 1977 - 1 April 1978 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Edward G. Kelliher		8. CONTRACT OR GRANT NUMBER(s) DAAK 70-77-C-0049
9. PERFORMING ORGANIZATION NAME AND ADDRESS UNDERSEA RESEARCH CORPORATION 7777 Leesburg Pike, Suite 306 Falls Church, Virginia 22043		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE 1 April 1978 13. NUMBER OF PAGES 24
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) U. S. Army Mobility Equipment Research and Development Command Fort Belvoir, Virginia 22060		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Walsh Transforms
Image Processing
Orthogonal Transforms
Feature Extraction
Plasma Discharge Display Devices

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

a description of a special purpose R&D system for performing direct two-dimensional Walsh transforms of images is described. The system is capable of obtaining 512^2 Walsh coefficients of two-dimensional images in approximately 10 seconds. Successful tests of the system's performance using simple images are also described.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL - 0140	2. GOVT ACCESSION NO. AD-A054 003	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) ELEVATION DATA COMPACTION BY POLYNOMIAL MODELING		5. TYPE OF REPORT & PERIOD COVERED Technical Report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) James R. Jancaitis		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE April 1978
		13. NUMBER OF PAGES 45
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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report details the status of ongoing research directed towards development of a near-term production implementation of digital data compression of terrain elevation information. The first section discusses the important data characteristics, the major applications, and the compression needs. The second section discusses the various published terrain representations, their capabilities and limitations. The third section presents an overview

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20. continued

of the Polynomial Terrain Model's characteristics and construction. The next section contained the development plan identified for production implementation of the polynomial modeling technique, and the remaining sections report on the status of various phases of this development. The results showed that the Polynomial Matrix method is the most promising of the various digital terrain formats (DFT).

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL - 0141	2. GOVT ACCESSION NO. AD-A054 007	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* INVESTIGATION OF THE APPLICATION OF "ARRAY ALGEBRA" TO TERRAIN MODELING		5. TYPE OF REPORT & PERIOD COVERED Technical Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) James R. Jancaitis Ronald L. Magee		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE April 1978 13. NUMBER OF PAGES 58
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This report investigates the application of array algebra to ETL's terrain modeling procedure in the following manner: 1. analyze array algebra to verify specifically the equivalence of array algebra and the conventional least-squares solutions, 2. analytically and empirically compare the computational efficiency of ETL's terrain modeling algorithm using the current least-squares method and the array algebra technique, 3. investigate

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20. continued

the applicability of Rauhala's array algebra to the ETL terrain modeling algorithm. The results showed that the array algebra algorithm is computationally equivalent to the least squares algorithm but has higher implementational overhead. The array algebra algorithm is also less efficient for the ETL terrain modeling problem.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL - 0142	2. GOVT ACCESSION NO. AD-A054 008	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* NEAR REAL TIME APPLICATION OF DIGITAL TERRAIN DATA IN A MINICOMPUTER ENVIRONMENT		5. TYPE OF REPORT & PERIOD COVERED Technical Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) James R. Jancaitis William R. Moore		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE April 1978 13. NUMBER OF PAGES 27
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19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Two developments have combined to significantly impact the growing number of applications dependent upon digital terrain elevation data, mathematical terrain modeling, and minicomputer growth. Digital representation of terrain form has previously required vast amounts of mass storage with the relatively slow speed data access associated with large databases. A technique has been developed for compact digital storage of elevation data which also decreases the data

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20. continued

access times significantly, a polynomial terrain model. Also, the minicomputer industry has been experiencing dramatic increases in the processing speeds and digital storage capabilities along with steadily declining costs. Preliminary results of a recently initiated study into the impact of these developments on utilization of digital terrain elevation data is presented.

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1. REPORT NUMBER ETL-0143	2. GOVT ACCESSION NO. AD-A055 468	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) BIBLIOGRAPHY OF IN-HOUSE AND CONTRACT REPORTS, SUPPLEMENT 6		5. TYPE OF REPORT & PERIOD COVERED Bibliography, Supplement 6 1 Jan. 77 - 31 Dec. 77 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Sharon Murphy Odle		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE April 1978 13. NUMBER OF PAGES 82
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This is supplement 6 to the report titled "Bibliography of In-House and Contract Reports," (AD-877 653L), (Supplement 1, AD-890 066L), (Supplement 2, AD-905 548L), (Supplement 3, AD-B005 275L), (Supplement 4, AD-B010 642L), (Supplement 5, AD-B019 966L). It is a continuing bibliography of reports prepared by and for the U.S. Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, Virginia. This bibliography includes reports published from 1 January 1977 through 31 December 1977.

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1. REPORT NUMBER ETL-0144	2. GOVT ACCESSION NO. AD-B028 228L	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A UNIFIED APPROACH TO MAPPING, CHARTING, AND GEODESY (MC&G) DATA BASE STRUCTURE DESIGN		5. TYPE OF REPORT & PERIOD COVERED Final Report 30 Oct 1977 - 31 May 1978 6. PERFORMING ORG. REPORT NUMBER TR-1101-1
7. AUTHOR(s) William K. Sharpley John F. Leiserson Allan H. Schmidt, Harvard University		8. CONTRACT OR GRANT NUMBER(s) DAAK70-77-C-0265
9. PERFORMING ORGANIZATION NAME AND ADDRESS The Analytic Sciences Corporation 6 Jacob Way Reading, Massachusetts 01867		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS CLIN 0001 & 0002
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		12. REPORT DATE 31 May 1978 13. NUMBER OF PAGES 177
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified; Appendix C, published separately, classified Top Secret. 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE IMPDET
16. DISTRIBUTION STATEMENT (of this Report) Distribution Limited to U.S. Government Agencies only; Proprietary Information: 31 May 1978: Other Requests for this Document must be Referred to Commander and Director, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia 22060.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) MC&G Archives, MC&G Data Base Hierarchy, Image Data Bases, Image Archives, Topological Data Bases, Data Base Design, MC&G Data Bases.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This is the final report for an investigation of a possible unified approach to Mapping, Charting and Geodesy (MC&G) data base structure design. The purposes of this investigation were to analyze the implications of various image archive structures in support of MC&G production and to demonstrate the potential value of recent results in Topological Data Base structures in MC&G applications. This report presents the results of the investigation. It includes analysis of the merits and deficien-		

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cies of the various approaches and the results of an experimental application of Topological Data Base Structuring principles in an example MC&G data base processing problem.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0145	2. GOVT ACCESSION NO. AD-A056 006	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) AN EVALUATION OF THE METHOD OF DETERMINING PARALLAX FROM MEASURED PHASE DIFFERENCES		5. TYPE OF REPORT & PERIOD COVERED Research Note 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Michael A. Crombie and Robert S. Rand.		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Computer Sciences Laboratory U.S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 63701BR3202BB20
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		12. REPORT DATE December 1977 13. NUMBER OF PAGES 30
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Autocorrelation
Parallax
Phase Shifts
Epipolar Scans
Fourier Transform

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The practicality of determining parallax by means of detecting phase differences extracted from corresponding epipolar scans was evaluated using a digitized aerial image. The method was found to be not as accurate and not as efficient as conventional image matching techniques.

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1. REPORT NUMBER ETL-0146	2. GOVT ACCESSION NO. AD-A062 551	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* Digital Data Editing System		5. TYPE OF REPORT & PERIOD COVERED Final - 26 Feb 76 to 25 Feb 77 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) William E. Handler		8. CONTRACT OR GRANT NUMBER(s) DAAG53-76-C-0095
9. PERFORMING ORGANIZATION NAME AND ADDRESS Lundy Electronics 1 Robert Lane Glen Head, N. Y. 11545		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project T76-0164
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		12. REPORT DATE September 1977 13. NUMBER OF PAGES 25
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18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Digital Data
Editing
Computers
Interactive Displays

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

A requirement within a computerized map and chart production process is editing of the digitized data prior to the final copy. This paper describes an off-line editing subsystem of the semi-automated cartography system developed by the U. S. Army Engineer Topographic Laboratory (USAETL) at Fort Belvoir and the Defense Mapping Agency (DMA) production Centers.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0147	2. GOVT ACCESSION NO. AD-A063 885	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) THE RADOT CODE FOR THE TRACKING OF RADAR INCIDENT ON TREES		5. TYPE OF REPORT & PERIOD COVERED Final Report 6. PERFORMING ORG. REPORT NUMBER MR-7058
7. AUTHOR(s) M. O. Cohen H. A. Steinberg		8. CONTRACT OR GRANT NUMBER(s) DAAK70-77-C-0243
9. PERFORMING ORGANIZATION NAME AND ADDRESS Mathematical Applications Group, Inc. 3 Westchester Plaza Elmsford, N. Y. 10523		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 4A161102B52C S3 0003
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE February 1978 13. NUMBER OF PAGES 33
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Radar
Simulation of Trees
Simulation of Forests
Computer Code
Distributions of Intercepts

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A computer code, RADOT, has been developed to track incident radar through forests consisting of realistically simulated trees.

RADOT fires parallel radar rays at the simulated forest and records information for all materials intersected between the origin and the ground. This information includes type of object (branch, twig or leaf), its size and orientation parameters (components of normal or axis vector) and the depth.

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20. (continued)

RADOT has been successfully installed on the ETL CDC-6400 computer. Other vesions, for IBM-360 or CDC-6600 computers are also available.

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1. REPORT NUMBER ETL-0148	2. GOVT ACCESSION NO. AD-A056 007	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) TEST OF MAP-READ MAGNETIC DECLINATION ACCURACY		5. TYPE OF REPORT & PERIOD COVERED Technical Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Glenn W. Schmeidel		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Proj: 1S763712D673 Task No: 12 Work Unit: 0001
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE May 1978 13. NUMBER OF PAGES 26
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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Magnetic compass
Magnetic declination
Magnetic variation

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report covers a test of how accurately a map-referenced magnetic declination represents the actual magnetic declination found by measuring true north and magnetic north at various points selected at random within the mapped area. The undeveloped area in Quantico, Virginia was investigated and found to have individual variations as great as 23 mils, with a 1-sigma standard deviation of 8 mils from the map-read value.

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1. REPORT NUMBER ETL-0149	2. GOVT ACCESSION NO. AD-A064 818	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Design and Feasibility Study of an Off-Line Digital Orthoprinter for Field Use		5. TYPE OF REPORT & PERIOD COVERED Final Report - 30 Aug 77 to 30 Apr 78 6. PERFORMING ORG. REPORT NUMBER EC/2107301-FR
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s) DAAK70-77-C-0196
9. PERFORMING ORGANIZATION NAME AND ADDRESS EIKONIX Corporation 103 Terrace Hall Avenue Burlington, MA 01803		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		12. REPORT DATE September 1978 13. NUMBER OF PAGES 79
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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Off-Line Digital Orthoprinter
Digital Orthoprinter
Van-mounted orthoprinter

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A van-mounted off-line orthoprinter suitable for field use is required. A digital orthoprinter provides a simpler and more rugged system design compared to the complex and sensitive hardware systems commercially available. This program was performed to evaluate the feasibility of an off-line digital orthoprinter that provides the required ruggedness and the speed and accuracy for orthophotos. In pursuance of this program EIKONIX formulated a system concept that employs a drum scanner writer for the van-mounted digital orthoprinter. Available rectification and differential rectification

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20. Continued

Algorithms were implemented during this program to evaluate distortion parameters expected from camera systems. These distortion parameters were required inputs for design of the drum scanner with a solid state linear array. This work demonstrates that the digital, drum scanner design approach meets the objectives for orthophoto production in the field.

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1. REPORT NUMBER ETL-0150	2. GOVT ACCESSION NO. AD-A058 120	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A DATA BASE SIZING METHODOLOGY APPLIED TO THE ARMY TERRAIN INFORMATION SYSTEM (ARTINS)		5. TYPE OF REPORT & PERIOD COVERED Technical Report Jun 77-Mar 78
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Regis J. Orsinger		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Va 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 4A762707A855
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Va 22060		12. REPORT DATE June 1978
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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Digital Terrain Data
Data Base
Information Systems
Terrain Analysis
Data Base Management System

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The objective of this report is to describe a methodology for estimating the storage requirements of a terrain data base as a function of geographic location and areal extent. This is done within the context of the development of a tactical data system called the Army Terrain Information System (ARTINS). The conclusions are: (1) The feasibility of storing a large terrain data base on militarized, or commercial, random access devices is clearly demonstrated.

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20. Continued

(2) A predictive methodology can be employed quickly and cheaply to estimate terrain data base storage requirements.
(3) The total storage requirement is relatively insensitive to change in horizontal spacing in the range beyond 125 meters.
(4) The storage requirement attributed to feature data can be dramatically reduced by modifying the required level of detail and/or the criteria for including and segmenting features.

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1. REPORT NUMBER ETL-0151	2. GOVT ACCESSION NO. AD-A059 628	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) LANDSAT D: CORPS OF ENGINEERS INTERFACE WITH ADVANCED NASA GROUND SYSTEMS STUDY		5. TYPE OF REPORT & PERIOD COVERED Contract Report 6. PERFORMING ORG. REPORT NUMBER GE No. 78SDXXXX
7. AUTHOR(s) T. Aepli, W. Dallam, J. Brooks, A. Park, A. Carafides, D. M. Smith		8. CONTRACT OR GRANT NUMBER(s) DAAK70-77 C 0237
9. PERFORMING ORGANIZATION NAME AND ADDRESS General Electric Space Division 5030 Herzel Place Beltsville, MD 20705		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE June 1978 13. NUMBER OF PAGES 147
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Landsat D
Thematic Mapper Digital Data
Management System
EROS Data Center
Image Data Processing Systems.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The object of the study was to determine and analyze alternative interface with the LANDSAT D ground data distribution system. The approach taken was to identify and define the requirements for data needed to meet the demands of the Civil Works Operation. These were then worded as criteria for structuring alternative system options. The key issues emanating from the requirements portion of the study are: Perishability of the data volumes required in each district. LANDSAT D data path was investigated with regard to these data needs leading to identification of access paths and data

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20. (Continued)

availability. Also, a characterization of the media of data transmission was provided. This report discusses the parameters that must be considered to effectively evaluate the alternatives that are available to the COR for interfacing with the LANDSAT D data system. Key issues of several alternatives are characterized.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0152	2. GOVT ACCESSION NO. AD-B029 693 L	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A DIGEST OF HIGH TEMPERATURE STORAGE LITERATURE		5. TYPE OF REPORT & PERIOD COVERED 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Paul F. Krause		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 6.27.30A 4A762730AT42 A4/E2002
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE July 1978 13. NUMBER OF PAGES 134
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16. DISTRIBUTION STATEMENT (of this Report)

Distribution limited to U. S. Government Agencies only; Test and evaluation; July 1978. Other requests for this document must be referred to: Commander and Director, U. S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia 22060

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Environmental Design Criteria
Environmental Tests
Storage Temperatures
Materiel Temperatures
High Temperatures
Extreme Environmental Conditions

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

An investigation was made of available unclassified literature pertaining to high temperatures attained by military items during storage. References reviewed for this report are summarized, and where applicable, generalizations are made as to the significant findings and/or shortcomings present. Each reviewed report is cross-referenced to related reports contained herein. The response of a stored item to the ambient environment is dependent upon the thermal response characteristics of the stored item and its storage mode, and upon the variables of the ambient environment, the most important of which is solar radiation.

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20. Continued

Even in the most extreme cases discovered during this investigation, the internal temperatures of stored materiel were never much higher than 140°F (60°C).

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0153	2. GOVT ACCESSION NO. AD-A059 942	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* TOWARD AUTOMATIC EXTRACTION OF CARTOGRAPHIC FEATURES		5. TYPE OF REPORT & PERIOD COVERED Contract - Final 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) George Stockman		8. CONTRACT OR GRANT NUMBER(s) DAAK 70-77-C-0110
9. PERFORMING ORGANIZATION NAME AND ADDRESS L.N.K. Corporation 302 Notley Court Silver Spring, Maryland 20904		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE July 1978 13. NUMBER OF PAGES 119
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)* U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		15. SECURITY CLASS. *(of this report)* Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Artificial intelligence	Geographic knowledge sources
Automated cartography	Image analysis
Cartographic feature extraction	Image understanding
Geographic data bases	pattern recognition

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The problem of automatically extracting map symbology from source imagery is studied. It is concluded that a great deal of geographic knowledge used by humans, who currently perform this extraction function, must be made available to machines before the function can be automated. Several geographic knowledge sources are discussed and an attempt is made to define paradigms under which knowledge can be encoded and used in the computer.

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20. Continued

An automatic cartographic feature extraction system (ACES) is sketched which represents a best framework for continuing development on this difficult problem given current achievements. A systems approach is taken with first consideration given to desired outputs and available inputs. It is concluded that input/output technology is far in advance of technology available for interpretation of the data. Emphasis is placed on the use of knowledge by ACES during automatic interpretation of imagery. Many types of knowledge typically used by humans appear difficult to engineer into automatic processes. Use of positional knowledge encoded in a geographic data base (GDB) is selected as the most promising avenue. Proposals are given for future research work in that direction.

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REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER: ETL-0154	2. GOVT ACCESSION NO.: AD-A059 967
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE (and Subtitle): Background Study and Selection Criteria Analysis of MIL-STD-810C: Environmental Test Methods	5. TYPE OF REPORT & PERIOD COVERED: Interim Technical Report 10 Jan - 10 July 1978
	6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): John W. Hamilton, Neal J. Plotkin	8. CONTRACT OR GRANT NUMBER(s): U.S. Army Contract DAAK70-78-C-0026
9. PERFORMING ORGANIZATION NAME AND ADDRESS: ManTech of New Jersey Corporation, Services Division, 6110 Executive Blvd., Rockville, MD 20852	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: U. S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia 22060	12. REPORT DATE: July 1978
	13. NUMBER OF PAGES: 80
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office):	15. SECURITY CLASS. (of this report): UNCLASSIFIED
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18. SUPPLEMENTARY NOTES

Prepared in cooperation with Tri-Service and Industry Environmental Study Group responsible for the revision to MIL-STD-810C.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Environmental Testing	Test Specifications	Acceptance Testing
Environmental Test Methods	Qualification Testing	Test Guidance
Environmental Test Planning	Climatic Environments	Sequential Testing
Environmental Test Guidance	Climatics	Test Synergism
Climatic Testing	Military Test Requirements	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Purpose of study was to determine the rationale for the inclusion of each of the thirteen climatic tests in MIL-STD-810C; determine the rationale and utility of test procedures; and provide guidance for the selection of tests, including when a test should or should not be used.

Investigation took two forms: research of other environmental test standards and documents, and interviews with people in Department of Defense and industry. Members of the Tri-Service and Industry Environmental Study Group, responsible for

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revision to the Standard, were also contacted.

Major conclusions regarding individual tests included: lack of coordination among tests which include temperature; lack of coordination and guidance among single-and multiple-factor tests; lack of guidance for corrective action following test failure; and, inadequacy of test guidance.

Major conclusions dealing with overall testing included lack of a means of reflecting in present procedures the impact of differences in environmental requirements factors such as stage of testing in the acquisition process, use environment, and type of equipment; and, lack of consistency in applying test limits.

Recommendations included need to address factors impacting on environmental test specification development; need for coordination, correlation, and test selection criteria; and need for combined factors test sequencing. A major recommendation was the need to develop guidance in the form of a logical, step-by-step approach which will ensure that the developer or planner will consider all factors and aspects bearing on the development of environmental test specifications and plans for his equipment.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0156	2. GOVT ACCESSION NO. AD-A059 548	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) MATERIALS RESEARCH FOR HOLOGRAPHIC RECORDING (REPORT NO. 2, BLEACHING METHODS FOR PHOTOGRAPHICALLY RECORDED HOLOGRAMS)		5. TYPE OF REPORT & PERIOD COVERED Technical Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) John W. Eastes		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 4A161102B52C
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE August 1978 13. NUMBER OF PAGES 20
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16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Holography
Chemical Bleaching of Amplitude Holograms

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report describes tests and evaluations of chemical bleaches used to convert amplitude holograms to phase holograms. Diffraction efficiencies and noise characteristics of holograms prepared with six different bleaching procedures are reported. Formulations of the six different bleachs and procedures for their use are described. The report concludes that a reversal bleach used in combination with 649F plates gave the best combination of diffraction efficiency and signal-to-noise ratio. The report also concludes that bleached silver halide recording materials can applied to areas where single images are involved, but

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20. Continued

that limited dynamic range will preclude their use as a medium for storing multiple continuous tone images.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL - 0157	2. GOVT ACCESSION NO. AD-A060 251	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) DELTA PULSE CODE MODULATION COMPRESSION RELATIVE TO STEREO IMAGE MATCHING		5. TYPE OF REPORT & PERIOD COVERED Research Note 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Michael A. Crombie		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 63701BR3202BB20
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		12. REPORT DATE September 1978 13. NUMBER OF PAGES 31
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Delta Pulse Code Modulation (DPCM)
Correlation
Quantization
Linear Predictors
Compression

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The effect of DPCM compression on stereo image matching is analyzed. It was determined for the aerial image used in the study that third order linear prediction is adequate and that DPCM compression does not introduce a bias in stereo matching. The standard error of mismatch for images compressed to one bit per pixel compared to 8-bit images is approximately two-thirds of a pixel spacing for each coordinate.

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1. REPORT NUMBER ETL-0158 - 1	2. GOVT ACCESSION NO. AD-A060 171	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SYSTEM ANALYSIS OF THE ENTIRE TOPOGRAPHIC SUPPORT SYSTEM		5. TYPE OF REPORT & PERIOD COVERED Interim Report 1 Oct 77 - 1 June 78 6. PERFORMING ORG. REPORT NUMBER R-187
7. AUTHOR(s) Robert S. Colombo C. Thomas Goldsmith Andrew Maceiko Clinton D. Upham		8. CONTRACT OR GRANT NUMBER(s) DAAK-70-77-C-0275
9. PERFORMING ORGANIZATION NAME AND ADDRESS DECILOG, INC. 555 Broadhollow Road Melville, NY 11746		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		12. REPORT DATE 15 July 78 13. NUMBER OF PAGES 80
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Topographic Systems
Battlefield Systems
Simulation
System Throughput Efficiency

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Topographic Support System (TSS) is intended to supply all of the Army's requirements for topographic and military geographic information during a short, high intensity combat situtation. The purpose of the System Analysis, which is described in this report, was to determine:

- Whether or not the TSS had over or under capacity
- To locate "bottlenecks," (if any), in the TSS which restrict production flow

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- To recommend solutions to problems, if any were detected.

A discrete events System Simulation Model was utilized as the analysis tool. The language is one that is commonly used in the analysis of large-scale assembly and production facilities, warehousing operations, etc.

A "scenario," consisting of 39 different product requests, together with their frequency of occurrence, priority, number of originals and final copies, etc., was generated. These products requests were entered into the TSS at the rate of three per hour for a 144-hour period, both to simulate the high intensity combat environment and also to stress the system.

The TSS configuration, as of January 1978, was simulated utilizing the CDC 6600 computer. Under capacity was found in Drafting and throughput problems were found in the production of products which utilize aerial imagery. Drafting capacity was then doubled, and the under capacity was eliminated. Doubling of two other Modules, containing photo processing type equipments, improved throughput considerably, but did not result in achieving adequate production rates.

Upon detailed examination of the results, it became apparent that the problem with Image Based Products resulted from intermediate products recycling through the same equipments. Often these equipments were located in different Modules, further increasing delays.

Minor modifications were made to four Modules, in some cases, adding equipments, in other cases, merely moving equipments. Simulating this configuration, the production of the Image Based Products improved markedly, but throughput remained unacceptable.

Finally, an Interactive Graphics System was substituted for one of the drafting modules, an Analytical Stereoplotter Module was added, and the simulation, again, re-run. The Interactive Graphics had no significant effect on drafting production. Analysis revealed that this was a result of the assumption made that the TSS would not be provided with a digital data base.

The Analytical Stereoplotter is significantly increased the Production Rate of the TSS.

Although the simulations were equipment-oriented, detailed analysis of the data indicated that some of the remaining problems might be due to personnel distributions and procedures. The July 1978 configuration of the TSS will be simulated in a model which will allow re-distribution of personnel. The results of these simulations should show an improvement in throughput.

It is concluded that the TSS, as currently configured, can meet some quick response requests. With major reconfiguration, which would make the TSS product-oriented, it should be able to meet all requests in less than 48 hours in an intense combat environment.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0158-2	2. GOVT ACCESSION NO. AD-A060 158	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SYSTEM ANALYSIS OF THE ENTIRE TOPOGRAPHIC SUPPORT SYSTEM (TSS)		5. TYPE OF REPORT & PERIOD COVERED Final Report 1 Oct 77 - 30 Aug 78
		6. PERFORMING ORG. REPORT NUMBER R-187A
7. AUTHOR(s) Robert S. Colombo C. Thomas Goldsmith Andrew Maceiko Clinton D. Upham		8. CONTRACT OR GRANT NUMBER(s) DAAK-70-C-0275
9. PERFORMING ORGANIZATION NAME AND ADDRESS DECILOG, INC. 555 Broadhollow Road Melville, NY 11746		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		12. REPORT DATE 30 Aug 78 13. NUMBER OF PAGES 44
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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Topographic Systems
Battlefield Systems
Simulation
System Throughput Efficiency

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

An Interim Report on this program, dated 15 July 1978, concluded, among other things, that the Topographic Support System (TSS) configuration, agreed to by the Integrated Equipment Evaluation Team (IEET) at its June 1978 meeting, should be simulated. In addition, it was recommended that this new simulation have the capability of varying the number of personnel in the TSS to resolve staffing problems. This has been accomplished, and the results are contained in this report.

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20. (Continued)

The previously simulated TSS configurations contained a maximum of 26 Modules, while the IEET recommended a total of 34. Engineer Topographic Laboratories personnel recommended changes to the previously used Product List and Procedures List. These changes generally had the effect of decreasing Production times.

At an interarrival rate of three requests per hour, the system performed very well in most product categories, and adequately in all others. Almost 73% of all requested products had been completed at the end of 144 hours. Only the Copy Camera had a significant queue.

The simulation was then run again with a 33% reduction in personnel, and performed equally well. Overcapacity was found in several equipment areas.

The simulation was also run at an interarrival rate of two requests per hour, and, at the end of 144 hours, almost 86% of all requests had been completed. This represents almost all which could have been completed if products had no competition. Overcapacity also increased.

It is concluded that the IEET-recommended TSS will produce products and services rapidly in a combat environment. It is noted, however, that the approximately 50% increase in Module count resulted in a 25% increase in throughput over the previously simulated TSS reconfiguration, which introduced some product orientation into the system.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0160	2. GOVT ACCESSION NO. AD-A061 820	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* INVESTIGATION OF ELECTRO-ACOUSTIC TECHNOLOGY FOR TOPOGRAPHIC APPLICATIONS		5. TYPE OF REPORT & PERIOD COVERED Research Note
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Frederick W. Rohde		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Ft. Belvoir, Virginia 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 4A161101A91D Task 01 Work Unit 0059
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Ft. Belvoir, Virginia 22060		12. REPORT DATE September 1978
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14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* Unclassified
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18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Studies were made of surface acoustic wave (SAW) and acousto-optical (A/O) devices for image processing and feature extraction from images. In the report, each device is defined, signal processing with the devices is discussed, and topographic applications for the devices are reviewed. The report concludes that the devices may be used in signal processing and decision circuitry for topographic systems, for example, distance measurement equipment (DME), radar return receivers, and image analyzers.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0161	2. GOVT ACCESSION NO. AD-A064 613	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) KALMAN FILTERING AND SMOOTHING IN FOTONAP For Orbit Determination Using GPS Measurements		5. TYPE OF REPORT & PERIOD COVERED Contract Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Georg E. Morduch David A. Bergeron		8. CONTRACT OR GRANT NUMBER(s) DAAK70-77-C-0254
9. PERFORMING ORGANIZATION NAME AND ADDRESS Old Dominion Systems, Inc. 4 Professional Drive, Suite 119 Gaithersbury, Maryland 20760		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE September 1978 13. NUMBER OF PAGES 129
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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Orbit Determination
Kalman Filter,
Atmospheric Refraction
Atmospheric Drag
Doppler Tracking

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Fotonap program has been modified to incorporate (i) A Kalman filter and a fixed lag smoother, (ii) the capability to handle GPS measurements through the filter/smoother, (iii) a Lockheed-Jacchia dynamic atmospheric model, (iv) a discretely changing atmospheric drag coefficient (drag segmentation), and (v) the capability to accept as input to the regular Fotonap the output from the filter/smoother including the full covariance matrix. The derivation of all the required equations is given in this report. Updated versions of Fotonap exist for both CDC 6400 and Univac 1108 computers.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0162	2. GOVT ACCESSION NO. AD-A062 010	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) INVESTIGATION OF DISCRETE FUNCTION TECHNOLOGY FOR TOPOGRAPHIC SCIENCES		5. TYPE OF REPORT & PERIOD COVERED Research Note 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Frederick W. Rohde		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 4A161101A91D, Task 01 Work Unit 0060
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060		12. REPORT DATE October 1978 13. NUMBER OF PAGES 19
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Applications of discrete function technology in the topographic sciences with emphasis upon the extraction of cartographic features from images is discussed. Specifically, research was done on the use of various orthogonal sets of functions for decomposing topographic images in spectral components and whether such decompositions are useful for the extraction of cartographic and terrain features. Also, Fourier, Block, Walsh, and Haar transforms of images for machine feature extraction were compared, and the potential of devices that may facilitate direct discrete transforms using electro-optical technology was studied.

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20 Continued

The report concludes that discrete function technology can be applied to at least three areas of the topographic sciences, namely to image analysis for cartographic and terrain feature extraction, to geopotential representation, and to remote sensing.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0163	2. GOVT ACCESSION NO. AD-A064 532	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) NEAR SURFACE BATHYMETRY SYSTEM Report No. 11 in the ETL Series on Remote Sensing		5. TYPE OF REPORT & PERIOD COVERED Technical Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Gunther Schwarz		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Data Processing and Products Division U.S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS R4302 DB20
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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Bathymetry
LANDSAT
Chart Updating
Multispectral Projection System
Navigational Danger Detection
LANDSAT Image Comparison

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report describes the Near Surface Bathymetry System built under contract for Defense Mapping Agency - Hydrographic Center. Tests were performed to determine the characteristics and adherence to the specifications set forth in the Purchase Description. This report contains the results of these tests.

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1. REPORT NUMBER ETL-0164	2. GOVT ACCESSION NO. AD-A061 771	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) OPTIMIZED POST-MISSION DETERMINATION OF THE DEFLECTION OF THE VERTICAL USING RGSS DATA		5. TYPE OF REPORT & PERIOD COVERED Contract Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s) DAAK 70-78-C-0069
9. PERFORMING ORGANIZATION NAME AND ADDRESS Phoenix Corporation 1600 Anderson Road McLean, Virginia 22102		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report is a continuation of an earlier report on a potentially optimal method of recovering deflections of the vertical from RGSS data. In this report, the implementation of the method and estimates of the errors associated with the method are described. In the first section, an optimal weighting technique is derived. This technique also leads directly to a prior error estimates. Next, the results from using the method on hypothetical traverses are described. From these data, it appears that the optimal method can lead to a significant reduction in the errors in estimating the

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deflections of the vertical. A final appendix gives instructions for the use of the associated computer program.

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4. TITLE (and Subtitle) PERFORMANCE EVALUATION OF THE POSITION AND AZIMUTH DETERMINING SYSTEM (PADS) WITH AN IMPROVED VERTICAL ACCELEROMETER		5. TYPE OF REPORT & PERIOD COVERED Equipment Test Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) F. M. Gloeckler, Jr. C. W. Oliver F. P. Vena		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories ATTN: ETL-TD-EB Fort Belvoir, VA 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 6.47.16.A 1E464716D578-29-0001
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Distribution limited to U.S. Government agencies only; Test and Evaluation; November 1978. Other requests for this document must be referred to Commander and Director, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, VA 22060.

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Inertial Navigation, Surveying, Accelerometer, Position, Elevation, Azimuth

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

During Development Test II of the Position and Azimuth Determining System (PADS), elevation errors for a significant percentage of missions exceeded the specification limit, even though overall performance was acceptable. To improve performance, the existing vertical channel accelerometer was replaced with a different type. Testing showed that the problem was corrected. The raw elevation error was 0.8 meter Probable Error; the adjusted error was 0.34 meter.

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1. REPORT NUMBER ETL-0174	2. GOVT ACCESSION NO. AD-A064 614	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) USER'S GUIDE TO DATA PREPARATION. PHOTOGRAMMETRIC NAVIGATION ANALYSIS PROGRAM FOTONAP		5. TYPE OF REPORT & PERIOD COVERED Contract Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Georg E. Morduch David A. Bergeron		8. CONTRACT OR GRANT NUMBER(s) DAAK70-77-C-0254
9. PERFORMING ORGANIZATION NAME AND ADDRESS Old Dominion Systems, Inc. 4 Professional Drive, Suite 119 Gaithersburg, Maryland 20760		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Orbit Determination
Atmospheric drag
Kalman filter
Doppler tracking
Atmospheric refraction

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report is a user's guide for the photogrammetric navigation analysis program (generally referred to as photonap) designed to provide the user with a detailed description of the control information needed to run photonap.

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